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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* MASUHIRO NATSUHARA,  
HIROHIKO NAKATA, and  
MANABU HASHIKURA

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Appeal 2008-1416  
Application 10/708,224  
Technology Center 3700

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Decided: April 28, 2008

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Before WILLIAM F. PATE, III, HUBERT C. LORIN, and  
BIBHU R. MOHANTY, *Administrative Patent Judges*.

LORIN, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

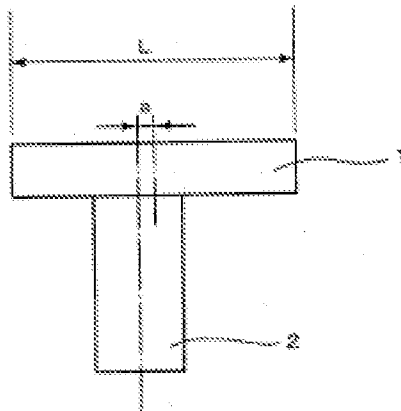
Masuhira Natsuhara, et al. (Appellants) seek our review under 35 U.S.C. § 134 of the final rejection of claims 1-4. We have jurisdiction under 35 U.S.C. § 6(b) (2002).

## SUMMARY OF DECISION

We AFFIRM.<sup>1</sup>

## THE INVENTION

The invention relates to wafer holders used in semiconductor manufacturing devices. Fig. 1 of the Specification shows a wafer holder 1 on a supporting shaft 2. According to the Specification (referring to Fig. 1), “the inventors found out that in order to bring the temperature distribution in the wafer- carrying side to within  $\pm 1.0\%$  the wafer holder 1 should be made to have a distance  $a$  between the center axis of the supporting shaft 2 and the axial center of the wafer-carrying side that is 5% or less of the diameter  $L$  of the wafer-carrying side.” Specification [0013]. Fig. 1 of the Specification is reproduced below:



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<sup>1</sup> Our decision will make reference to Appellants' Appeal Brief (“Br.,” filed Dec. 27, 2006) and the Examiner’s Answer (“Answer,” mailed Apr. 11, 2007).

Fig. 1 of the Specification is said to depict “one example of the sectional structure of a wafer holder according to the present invention.” Specification [0011].

Claim 1, reproduced below, is illustrative of the subject matter on appeal.

1. For a semiconductor manufacturing device, a wafer holder comprising:  
a substrate having a wafer-carrying side and a shaft-joining side, said shaft-joining side lent a planarity of 0.5 mm or less, and a surface roughness of 5  $\mu\text{m}$  or less in Ra, and  
a substrate-supporting shaft having a substrate-joining face lent a planarity of 0.5 mm or less, and a surface roughness of 5  $\mu\text{m}$  or less in Ra, and being of a substance whose difference in thermal expansion coefficient with the substrate is  $5 \times 10^{-6}$  K or less, said shaft joined to said shaft-joining side of said substrate such that a distance  $a$  between the center axis of said shaft and the axial center of said wafer-carrying side of said substrate is 5% or less of the diameter  $L$  of the wafer-carrying side, whereby the temperature distribution in the wafer-carrying side of said substrate is within  $\pm 1.0\%$ .

#### THE REJECTION

The Examiner relies upon the following as evidence of unpatentability:

Kobayashi

US 6,071,465

Jun. 6, 2000

The following rejection is before us for review:

1. Claims 1-4 are rejected under 35 U.S.C. § 103(a) as unpatentable over Kobayashi.

## ISSUES

The issue is whether the Appellants have shown that the Examiner erred in rejecting claims 1-4 under 35 U.S.C. § 103(a) as unpatentable over Kobayashi. In particular, the issue is whether Kobayashi would suggest to one of ordinary skill to provide “a distance  $a$  between the center axis of [the supporting shaft 2] and the axial center of [the] wafer-carrying side . . . [that] is 5% or less of the diameter  $L$  of the wafer-carrying side” (claim 1).

## FINDINGS OF FACT

We find that the following enumerated findings are supported by at least a preponderance of the evidence. *Ethicon, Inc. v. Quigg*, 849 F.2d 1422, 1427 (Fed. Cir. 1988) (explaining the general evidentiary standard for proceedings before the Office).

### *The scope and content of the prior art*

1. Kobayashi discloses a semiconductor manufacturing device. See Figs. 8-10.
2. Referring to Fig. 10 of Kobayashi, for example, the manufacturing device 34 comprises a base 37 with a surface 37a on which a wafer is set. Col. 12, l. 4.
3. The back side of the surface 37b of the base 37 is bonded to a “tube shaped body” 35. Col. 12, l. 5.
4. Fig. 10 of Kobayashi depicts the base 37 and body 35 as being in axially alignment.
5. According to Kobayashi, referring to the semiconductor manufacturing device embodiment shown in Figs. 8 and 9, “[e]ach



carrying side of [the] substrate [that] is 5% or less of the diameter *L* of the wafer-carrying side” (claim 1).

*The level of skill in the art*

8. Neither the Examiner nor the Appellant has addressed the level of ordinary skill in the pertinent art of semiconductor manufacturing devices. We will therefore consider the cited prior art as representative of the level of ordinary skill in the art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (“[T]he absence of specific findings on the level of skill in the art does not give rise to reversible error ‘where the prior art itself reflects an appropriate level and a need for testimony is not shown’”)(Quoting *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163 (Fed. Cir. 1985)).

*Secondary considerations*

9. There is no evidence on record of secondary considerations of non-obviousness for our consideration.

## PRINCIPLES OF LAW

“Section 103 forbids issuance of a patent when ‘the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.’” *KSR Int’l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1734 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the

prior art, (2) any differences between the claimed subject matter and the prior art, and (3) the level of skill in the art. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). *See also KSR*, 127 S.Ct. at 1734 (“While the sequence of these questions might be reordered in any particular case, the [*Graham*] factors continue to define the inquiry that controls.”) The Court in *Graham* further noted that evidence of secondary considerations “might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented.” 383 U.S. at 17-18.

#### ANALYSIS

The Appellants argued claims 1-4 as a group (Br. 10). We select claim 1, reproduced *supra*, as the representative claim for this group, and the remaining claims 2-4 stand or fall with claim 1. 37 C.F.R. § 41.37(c)(1)(vii) (2007).

We have reviewed the record and conclude that the Appellants have not shown error in the rejection.

The Examiner found that Kobayashi discloses all the claimed limitations but for “a distance  $a$  between the center axis of [the] shaft and the axial center of [the] wafer-carrying side of [the] substrate [that] is 5% or less of the diameter  $L$  of the wafer-carrying side” (claim 1). See Ans. 3-4. The Appellants do not dispute that finding. Also, the Examiner found, and Appellants do not dispute it, that Kobayashi shows the substrate and shaft to be made of aluminum nitride and “inherently meet[s] the claimed thermal expansion of coefficient along with the claimed temperature distribution in the wafer-carrying side of the substrate within 1.0%.” Answer 3-4.

The difference between the device as claimed and Kobayashi is that Kobayashi does not explicitly state “a distance  $a$  between the center axis of [the] shaft and the axial center of [the] wafer-carrying side of [the] substrate [that] is 5% or less of the diameter  $L$  of the wafer-carrying side” (claim 1). Regarding this difference, the Examiner contended that “Kobayashi shows in Figure 10 that the center of the supporting shaft [i.e., the tube shape body] is aligned with the center of the substrate [i.e., the base].” Answer 3. The Examiner further concluded that “[w]hile the claimed distance is not explicitly disclosed, it would have been obvious to one of ordinary skill in the art to have the center of the supporting shaft [ ] aligned with the center of the substrate within the claimed range to prevent unbalancing of the substrate on the supporting shaft as the substrate is further provided to support a wafer thereon.” Answer 3.

The Appellants argued that the motivation articulated by the Examiner for modifying the Kobayashi device to provide the claimed distance between the center axis of the supporting shaft and the axial center of the wafer-carrying side of the base is “merely ... a general statement.” Br. 10. “Yet the Examiner has failed to demonstrate how the Kobayashi device, thus modified “to prevent imbalancing” would meet Appellants’ claim 1 limitation with regard to “*the wafer-carrying side of a wafer holder.*” Br. 10 (emphasis original). The Examiner’s reasoning is also argued as being based on hindsight. Br. 11.

We do not find the Appellants’ argument persuasive as to error in the rejection.

The Examiner's contention that "Kobayashi shows in Figure 10 that the center of the supporting shaft is aligned with the center of the substrate" (Answer 3) appears to be accurate. Fig. 10 of Kobayashi depicts the base 37 and tube shape body 35 as being perfectly perpendicular to each other and in axially alignment where they are joined at their center. (See FF 6). The base is depicted as having a uniform cross-section. It would seem to follow that, to one of ordinary skill looking at this depiction, the "distance  $a$  between the center axis of the supporting shaft [of Kobayashi's tube shape body] and the axial center of the wafer-carrying side [of the Kobayashi base] is" as close to 0 as possible. Thus, the claimed device would appear to read on that shown in Kobayashi's, Fig. 10. Kobayashi arguably anticipates the claimed device. But, since anticipation is the epitome of obviousness, the Examiner nonetheless has presented a *prima facie* case of obviousness.

The Appellants argue that "[a]lthough the distance  $a$  can be zero, nowhere does the specification [of Kobayashi] teach or suggest that the goal of the of the present invention is to center the substrate on the shaft; indeed the shaft center axis is correlated to the axial center of the *wafer-carrying side* – not the back side where the shaft is joined – of the susceptor block [i.e., the base]. (emphasis original). " Br. 10.

The difficulty with this argument is two-fold.

First, nothing in claim 1 requires the shaft center axis *to be correlated* to the axial center of the wafer-carrying side of the base. Claim 1 is drawn to an apparatus where "a distance  $a$  between the center axis of said supporting shaft and the axial center of said wafer-carrying side of said substrate is 5% or less of the diameter  $L$  of the wafer-carrying side." The shaft center axis

need not *be correlated* to the axial center of the wafer-carrying side of the base.

Second, Kobayashi is not made less pertinent for not describing the Appellants' goal. "[T]he problem motivating the patentee may be only one of many addressed by the patent's subject matter. The question is not whether the combination was obvious to the patentee but whether the combination was obvious to a person with ordinary skill in the art."); *In re Kemps*, 97 F.3d 1427, 1430 (Fed. Cir. 1996); *In re Beattie*, 974 F.2d 1309, 1312 (Fed. Cir. 1992); *In re Dillon*, 919 F.2d 688, 693 (Fed. Cir. 1990) (en banc), *cert. denied*, 500 U.S. 904 (1991).

A claimed invention is unpatentable if the differences between it and the prior art are "such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." 35 U.S.C. § 103(a) (2000); *KSR Int'l v. Teleflex Inc.*, 127 S.Ct. 1727, 1734 (2007); *Graham v. John Deere Co.*, 383 U.S. 1, 13-14 (1966). One of ordinary skill looking at Fig. 10 of Kobayashi would understand the "distance *a* between the center axis of the [Kobayashi] supporting shaft and the axial center of the wafer-carrying side [of the Kobayashi base]" to be as close to 0 as possible. Kobayashi thus satisfies the limitation "a distance *a* between the center axis of said supporting shaft and the axial center of said wafer-carrying side of said substrate is 5% or less of the diameter *L* of the wafer-carrying side." (claim 1). Given no evidence to the contrary, the argument that Kobayashi does not render obvious the claimed device for not disclosing this limitation is not persuasive as to error in the Examiner's

rejection. There being no other limitations in the claim at issue, the rejection will be sustained.

#### CONCLUSIONS OF LAW

We conclude the Appellant has failed to show that the Examiner erred in rejecting claims 1-4 under 35 U.S.C. § 103(a) as unpatentable over Kobayashi.

#### DECISION

The decision of the Examiner to reject claims 1-4 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv) (2007).

#### AFFIRMED

vsh

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